



SEQUENCE LISTING

<110> Amasino, Richard
Schomburg, Fritz
Michaels, Scott
Sung, Si-Bum

<120> Alteration of Flowering Time in Plants

<130> 960296.96871

<140> 09/513,775
<141> 2000-02-25

<150> 60/121,572
<151> 1999-02-25

<150> 60/123,455
<151> 1999-03-05

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<170> PatentIn Ver. 2.1

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cga caa gtc acc ttc tcc aaa cgt cgc aac ggt ctc atc gag aaa gct 96
Arg Gln Val Thr Phe Ser Lys Arg Arg Asn Gly Leu Ile Glu Lys Ala
20 25 30

cgt cag ctt tct gtt ctc tgt gac gca tcc gtc gct ctt ctc gtc gtc 144
Arg Gln Leu Ser Val Leu Cys Asp Ala Ser Val Ala Leu Leu Val Val
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Ser Ala Ser Gly Lys Leu Tyr Ser Phe Ser Ser Gly Asp Asn Leu Val

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ttg gat cat cag tca aaa gct ctg aac tat ggt tca cac tat gag cta			288
Leu Asp His Gln Ser Lys Ala Leu Asn Tyr Gly Ser His Tyr Glu Leu			
85	90	95	
ctt gaa ctt gtg gat agc aag ctt gtg gga tca aat gtc aaa aat gtg			336
Leu Glu Leu Val Asp Ser Lys Leu Val Gly Ser Asn Val Lys Asn Val			
100	105	110	
agt atc gat gct ctt gtt caa ctg gag gaa cac ctt gag act gcc ctc			384
Ser Ile Asp Ala Leu Val Gln Leu Glu Glu His Leu Glu Thr Ala Leu			
115	120	125	
tcc gtg act aga gcc aag aag acc gaa ctc atg ttg aag ctt gtt gag			432
Ser Val Thr Arg Ala Lys Lys Thr Glu Leu Met Leu Lys Leu Val Glu			
130	135	140	
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Asn Leu Lys Glu Lys Glu Lys Met Leu Lys Glu Glu Asn Gln Val Leu			
145	150	155	160
gct agc cag atg gag aat aat cat cat gtg gga gca gaa gct gag atg			528
Ala Ser Gln Met Glu Asn Asn His His Val Gly Ala Glu Ala Glu Met			
165	170	175	
gag atg tca cct gct gga caa atc tcc gac aat ctt ccg gtg act ctc			576
Glu Met Ser Pro Ala Gly Gln Ile Ser Asp Asn Leu Pro Val Thr Leu			
180	185	190	
cca cta ctt aat tagccacctt aaatcggcgg ttgaaatcaa aatccaaaac			628
Pro Leu Leu Asn			
195			
atataataatt atgaagaaaa aaaaaataag atatgtaatt attccgctga taagggcgag			688
cgtttgtata tcttaatact ctctctttgg ccaagagact ttgtgtgtga tacttaagta			748
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Arg Gln Val Thr Phe Ser Lys Arg Arg Asn Gly Leu Ile Glu Lys Ala
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Arg Gln Leu Ser Val Leu Cys Asp Ala Ser Val Ala Leu Leu Val Val
35 40 45

Ser Ala Ser Gly Lys Leu Tyr Ser Phe Ser Ser Gly Asp Asn Leu Val
50 55 60

Lys Ile Leu Asp Arg Tyr Gly Lys Gln His Ala Asp Asp Leu Lys Ala
65 70 75 80

Leu Asp His Gln Ser Lys Ala Leu Asn Tyr Gly Ser His Tyr Glu Leu
85 90 95

Leu Glu Leu Val Asp Ser Lys Leu Val Gly Ser Asn Val Lys Asn Val
100 105 110

Ser Ile Asp Ala Leu Val Gln Leu Glu Glu His Leu Glu Thr Ala Leu
115 120 125

Ser Val Thr Arg Ala Lys Lys Thr Glu Leu Met Leu Lys Leu Val Glu
130 135 140

Asn Leu Lys Glu Lys Glu Lys Met Leu Lys Glu Glu Asn Gln Val Leu
145 150 155 160

Ala Ser Gln Met Glu Asn Asn His His Val Gly Ala Glu Ala Glu Met
165 170 175

Glu Met Ser Pro Ala Gly Gln Ile Ser Asp Asn Leu Pro Val Thr Leu
180 185 190

Pro Leu Leu Asn
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<222> (1)..(519)

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Arg Gln Val Thr Phe Ser Lys Arg Arg Asn Gly Leu Ile Asp Lys Ala
20 25 30

cga caa ctt tcg att ctc tgt gaa tcc tcc gtc gct gtt gtc gtc gta 144
Arg Gln Leu Ser Ile Leu Cys Glu Ser Ser Val Ala Val Val Val Val
35 40 45

tct gcc tcc gga aaa ctc tat gac tct tcc tcc ggt gac gac att tcc 192
Ser Ala Ser Gly Lys Leu Tyr Asp Ser Ser Gly Asp Asp Ile Ser
50 55 60

aag atc att gat cgt tat gaa ata caa cat gct gat gaa ctt aga gcc 240
Lys Ile Ile Asp Arg Tyr Glu Ile Gln His Ala Asp Glu Leu Arg Ala
65 70 75 80

tta gat ctt gaa gaa aaa att cag aat tat ctt cca cac aag gag tta 288
Leu Asp Leu Glu Glu Lys Ile Gln Asn Tyr Leu Pro His Lys Glu Leu
85 90 95

cta gaa aca gtc caa agc aag ctt gaa gaa cca aat gtc gat aat gta 336
Leu Glu Thr Val Gln Ser Lys Leu Glu Glu Pro Asn Val Asp Asn Val
100 105 110

agt gta gat tct cta att tct ctg gag gaa caa ctt gag act gct ctg 384
Ser Val Asp Ser Leu Ile Ser Leu Glu Glu Gln Leu Glu Thr Ala Leu
115 120 125

tcc gta agt aga gct agg aag gca gaa ctg atg atg gag tat atc gag 432
Ser Val Ser Arg Ala Arg Lys Ala Glu Leu Met Met Glu Tyr Ile Glu
130 135 140

tcc ctt aaa gaa aag gag aaa ttg ctg aga gaa gag aac cag gtt ctg 480
Ser Leu Lys Glu Lys Glu Lys Leu Leu Arg Glu Glu Asn Gln Val Leu
145 150 155 160

gct agc cag ctg tca gag aag aaa ggt atg tct cac cga tgaaagatac 529
Ala Ser Gln Leu Ser Glu Lys Lys Gly Met Ser His Arg

165

170

tcaaaaacccg atgggaaaga atacgttgct ggcaacagat gatgagagag gaatgttcc 589
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atcaacggct gagtttcac cttaaactca aagcctgatt cataattaag agaataaatt 709
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<213> *Arabidopsis thaliana*

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Arg Gln Leu Ser Ile Leu Cys Glu Ser Ser Val Ala Val Val Val
35 40 45

Ser Ala Ser Gly Lys Leu Tyr Asp Ser Ser Ser Gly Asp Asp Ile Ser
50 55 60

Lys Ile Ile Asp Arg Tyr Glu Ile Gln His Ala Asp Glu Leu Arg Ala
65 70 75 80

Leu Asp Leu Glu Glu Lys Ile Gln Asn Tyr Leu Pro His Lys Glu Leu
85 90 95

Leu Glu Thr Val Gln Ser Lys Leu Glu Glu Pro Asn Val Asp Asn Val
100 105 110

Ser Val Asp Ser Leu Ile Ser Leu Glu Glu Gln Leu Glu Thr Ala Leu
115 120 125

Ser Val Ser Arg Ala Arg Lys Ala Glu Leu Met Met Glu Tyr Ile Glu

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Ser Leu Lys Glu Lys Glu Lys Leu Leu Arg Glu Glu Asn Gln Val Leu
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cga caa gtc act ttc tcc aaa cga cgc aat ggt ctc atc gag aaa gct 96
Arg Gln Val Thr Phe Ser Lys Arg Arg Asn Gly Leu Ile Glu Lys Ala
20 25 30

cga caa ctt tca att ctc tgt gaa tct tcc atc gct gtt ctc gtc gtc 144
Arg Gln Leu Ser Ile Leu Cys Glu Ser Ser Ile Ala Val Leu Val Val
35 40 45

tcc ggc tcc gga aaa ctc tac aag tct gcc tcc ggt gac aac atg tca 192
Ser Gly Ser Gly Lys Leu Tyr Lys Ser Ala Ser Gly Asp Asn Met Ser
50 55 60

aag atc att gat cgt tac gaa ata cat cat gct gat gaa ctt gaa gcc 240
Lys Ile Ile Asp Arg Tyr Glu Ile His His Ala Asp Glu Leu Glu Ala
65 70 75 80

tta gat ctt gca gaa aaa act cgg aat tat ctg cca ctc aaa gag tta 288
Leu Asp Leu Ala Glu Lys Thr Arg Asn Tyr Leu Pro Leu Lys Glu Leu
85 90 95

cta gaa ata gtc caa agc aag ctt gaa tca aat gtc gat aat gca 336
Leu Glu Ile Val Gln Ser Lys Leu Glu Glu Ser Asn Val Asp Asn Ala
100 105 110

agt gtg gat act tta att tct ctg gag gaa cag ctc gag act gct ctg	384			
Ser Val Asp Thr Leu Ile Ser Leu Glu Glu Gln Leu Glu Thr Ala Leu				
115	120	125		
tcc gta act aga gct agg aag aca gaa cta atg atg ggg gaa gtg aag	432			
Ser Val Thr Arg Ala Arg Lys Thr Glu Leu Met Met Gly Glu Val Lys				
130	135	140		
tcc ctt caa aaa acg gag aac ttg ctg aga gaa gag aac cag act ttg	480			
Ser Leu Gln Lys Thr Glu Asn Leu Leu Arg Glu Glu Asn Gln Thr Leu				
145	150	155	160	
gct agc cag gtg aca aaa aca tct ctt gaa gct aat tca tca gtt gat	528			
Ala Ser Gln Val Thr Lys Thr Ser Leu Glu Ala Asn Ser Ser Val Asp				
165	170	175		
aca caa taaaaataga aattacactt gcgttaaaca tatatatata aaagttgaag	584			
Thr Gln				
gactttgatt gatgttaggc attttttttg tgaaacccccc atatatctta aaatctatga	644			
taaaagtccct ttcaaaattc aaatttcttg ttactattta gttgaatgat cagtttaat	704			
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Arg Gln Leu Ser Ile Leu Cys Glu Ser Ser Ile Ala Val Leu Val Val	35	40	45	
Ser Gly Ser Gly Lys Leu Tyr Lys Ser Ala Ser Gly Asp Asn Met Ser	50	55	60	
Lys Ile Ile Asp Arg Tyr Glu Ile His His Ala Asp Glu Leu Glu Ala	65	70	75	80

Leu Asp Leu Ala Glu Lys Thr Arg Asn Tyr Leu Pro Leu Lys Glu Leu
85 90 95

Leu Glu Ile Val Gln Ser Lys Leu Glu Glu Ser Asn Val Asp Asn Ala
100 105 110

Ser Val Asp Thr Leu Ile Ser Leu Glu Glu Gln Leu Glu Thr Ala Leu
115 120 125

Ser Val Thr Arg Ala Arg Lys Thr Glu Leu Met Met Gly Glu Val Lys
130 135 140

Ser Leu Gln Lys Thr Glu Asn Leu Leu Arg Glu Glu Asn Gln Thr Leu
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Thr Gln

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aga caa gtc acc tcc tgc aaa cga cgc aac ggt ctc atc gag aaa gct 96
Arg Gln Val Thr Ser Cys Lys Arg Arg Asn Gly Leu Ile Glu Lys Ala
20 25 30

cgt cag ctt tct gtt ctc tgc gag gca tct gtt ggg ctt ctc gtt gtc 144

Arg Gln Leu Ser Val Leu Cys Glu Ala Ser Val Gly Leu Leu Val Val			
35	40	45	
tcc gcc tcc gac aaa ctc tac agc ttc tcc tcc ggg gat aga ctg gag 192			
Ser Ala Ser Asp Lys Leu Tyr Ser Phe Ser Ser Gly Asp Arg Leu Glu			
50	55	60	
aag atc ctt gat cga tat ggg aaa aaa cat gct gat gat ctc aat gcc 240			
Lys Ile Leu Asp Arg Tyr Gly Lys Lys His Ala Asp Asp Leu Asn Ala			
65	70	75	80
ctg gat ctt cag tca aaa tct ctg aac tat agt tca cac cat gag cta 288			
Leu Asp Leu Gln Ser Lys Ser Leu Asn Tyr Ser Ser His His Glu Leu			
85	90	95	
cta gaa ctt gtg gaa agc aag ctt gtg gaa tca att gat gat gta agc 336			
Leu Glu Leu Val Glu Ser Lys Leu Val Glu Ser Ile Asp Asp Val Ser			
100	105	110	
gtg gat tcc ctc gtt gag cta gaa gat cac ctt gag act gcc ctc tct 384			
Val Asp Ser Leu Val Glu Leu Glu Asp His Leu Glu Thr Ala Leu Ser			
115	120	125	
gta act aga gct cgg aag gca gaa cta atg tta aag ctt gtt gaa agt 432			
Val Thr Arg Ala Arg Lys Ala Glu Leu Met Leu Lys Leu Val Glu Ser			
130	135	140	
ctc aaa gaa aag gag aat ctg ctg aaa gaa gag aac cag gtt ttg gct 480			
Leu Lys Glu Lys Glu Asn Leu Leu Lys Glu Glu Asn Gln Val Leu Ala			
145	150	155	160
agt cag att gag gag aaa aat ctt gag gga gcc gaa gct gat aat ata 528			
Ser Gln Ile Glu Glu Lys Asn Leu Glu Gly Ala Glu Ala Asp Asn Ile			
165	170	175	
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Glu Met Ser Ser Gly Gln Ile Ser Asp Ile Asn Leu Pro Val Thr Leu			
180	185	190	
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Pro Leu Leu Asn			
195			
ataatctaaa gataaccatat gtaggttta ctttcgcag cttatataac caccttact 688			
cggcggttaa tcgaaattaa aaacatataa ttaacaaata acctatgtca gtttaacccc 748			
ctgataaaaga tgcacgttgt gcatcttagt tctctcttg gctgaggggc tgtgtataaa 808			

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<213> Brassica rapa

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Arg Gln Leu Ser Val Leu Cys Glu Ala Ser Val Gly Leu Leu Val Val
35 40 45

Ser Ala Ser Asp Lys Leu Tyr Ser Phe Ser Ser Gly Asp Arg Leu Glu
50 55 60

Lys Ile Leu Asp Arg Tyr Gly Lys Lys His Ala Asp Asp Leu Asn Ala
65 70 75 80

Leu Asp Leu Gln Ser Lys Ser Leu Asn Tyr Ser Ser His His Glu Leu
85 90 95

Leu Glu Leu Val Glu Ser Lys Leu Val Glu Ser Ile Asp Asp Val Ser
100 105 110

Val Asp Ser Leu Val Glu Leu Glu Asp His Leu Glu Thr Ala Leu Ser
115 120 125

Val Thr Arg Ala Arg Lys Ala Glu Leu Met Leu Lys Leu Val Glu Ser
130 135 140

Leu Lys Glu Lys Glu Asn Leu Leu Lys Glu Glu Asn Gln Val Leu Ala
145 150 155 160

Ser Gln Ile Glu Glu Lys Asn Leu Glu Gly Ala Glu Ala Asp Asn Ile
165 170 175

Glu Met Ser Ser Gly Gln Ile Ser Asp Ile Asn Leu Pro Val Thr Leu
180 185 190

Pro Leu Leu Asn
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cga caa gtc acc ttc tcc aaa cga cgc agc ggt ctc atc gag aaa gct 96
Arg Gln Val Thr Phe Ser Lys Arg Arg Ser Gly Leu Ile Glu Lys Ala
20 25 30

cgt cag ctt tct gtt ctc tgc gag gca tct gtt ggg ctt ctc gtt gtc 144
Arg Gln Leu Ser Val Leu Cys Glu Ala Ser Val Gly Leu Leu Val Val
35 40 45

tcc gcc tcc gac aaa ctc tac agc ttc tcc tcc ggg gat aga ctg gag 192
Ser Ala Ser Asp Lys Leu Tyr Ser Phe Ser Ser Gly Asp Arg Leu Glu
50 55 60

aag atc ctt gat cga tat ggg aaa aaa cat gct gat gat ctc aat gcc 240
Lys Ile Leu Asp Arg Tyr Gly Lys Lys His Ala Asp Asp Leu Asn Ala
65 70 75 80

ctg gat ctt cag tca aaa tct ctg aac tat agt tca cac cat gag cta 288
Leu Asp Leu Gln Ser Lys Ser Leu Asn Tyr Ser Ser His His Glu Leu
85 90 95

cta gaa ctt gtg gaa agc aag ctt gtg gaa tca att gat gat gta agc 336
Leu Glu Leu Val Glu Ser Lys Leu Val Glu Ser Ile Asp Asp Val Ser
100 105 110

gtg gat tcc ctc gtt gag cta gaa gat cac ctt gag act gcc ctc tct 384
Val Asp Ser Leu Val Glu Leu Glu Asp His Leu Glu Thr Ala Leu Ser
115 120 125

gta act aga gct cgg aag gca gaa cta atg tta aag ctt gtt gaa agt 432
Val Thr Arg Ala Arg Lys Ala Glu Leu Met Leu Lys Leu Val Glu Ser
130 135 140

ctc aaa gaa aag gag aat ctg ctg aaa gaa gag aac cag gtt ttg gct 480
 Leu Lys Glu Lys Glu Asn Leu Leu Lys Glu Glu Asn Gln Val Leu Ala
 145 150 155 160

agt cag att gag aag aaa aat ctt gag gga gcc gaa gct gat aat ata 528
 Ser Gln Ile Glu Lys Lys Asn Leu Glu Gly Ala Glu Ala Asp Asn Ile
 165 170 175

gag atg tca tct gga caa atc tcc gac atc aat ctt cct gta act ctc 576
 Glu Met Ser Ser Gly Gln Ile Ser Asp Ile Asn Leu Pro Val Thr Leu
 180 185 190

ccg ctg ctt aat taaccacctt tactcggcgg ttaatcaaaa taagaaacat 628
 Pro Leu Leu Asn
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ataatctaaa gataacctat gtaggtttta ctttcgcag cttatatac caccttact 688
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 20 25 30

Arg Gln Leu Ser Val Leu Cys Glu Ala Ser Val Gly Leu Leu Val Val
 35 40 45

Ser Ala Ser Asp Lys Leu Tyr Ser Phe Ser Ser Gly Asp Arg Leu Glu
 50 55 60

Lys Ile Leu Asp Arg Tyr Gly Lys Lys His Ala Asp Asp Leu Asn Ala
 65 70 75 80

Leu Asp Leu Gln Ser Lys Ser Leu Asn Tyr Ser Ser His His Glu Leu

85

90

95

Leu Glu Leu Val Glu Ser Lys Leu Val Glu Ser Ile Asp Asp Val Ser
100 105 110

Val Asp Ser Leu Val Glu Leu Glu Asp His Leu Glu Thr Ala Leu Ser
115 120 125

Val Thr Arg Ala Arg Lys Ala Glu Leu Met Leu Lys Leu Val Glu Ser
130 135 140

Leu Lys Glu Lys Glu Asn Leu Leu Lys Glu Glu Asn Gln Val Leu Ala
145 150 155 160

Ser Gln Ile Glu Lys Lys Asn Leu Glu Gly Ala Glu Ala Asp Asn Ile
165 170 175

Glu Met Ser Ser Gly Gln Ile Ser Asp Ile Asn Leu Pro Val Thr Leu
180 185 190

Pro Leu Leu Asn
195